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SEPTEMBER, 1954

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CONTENTS

	Page
DOBROVSKY, T. M.—Laboratory Observations on <i>Conoderus vagus</i> Candeze (Coleoptera, Elateridae)	123
X DRAKE, CARL J., and ROLAND F. HUSSEY—Notes on Some American Vellidae (Hemiptera), with the Description of Two New Microvelias from Jamaica	133
X CARRIKER, M. A., JR.—Report on a Collection of Mallophaga, Largely Mexican (Part I)	139
BUTCHER, F. GRAY—A Muscid Fly, <i>Atherigona orientalis</i> Schin., a Pest on Cantaloupes	147
HEIDT, JAMES H.—A Report on a Case of Tick Paralysis in Dade County, Florida	149
X DRAKE, CARL J., and HAROLD C. CHAPMAN—New American Waterstriders (Hemiptera)	151
Notes	138
Book Notice	155

The
FLORIDA ENTOMOLOGIST

VOL. XXXVII

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LABORATORY OBSERVATIONS ON CONODERUS VAGUS CANDEZE (COLEOPTERA, ELATERIDAE)¹

R

T. M. DOBROVSKY

Potato Investigations Laboratory, Hastings, Florida

There is an abundance of information on the biology of many elaterids. The review of literature on this topic which Thomas published in 1940 lists twelve genera, but among them *Conoderus* takes a modest place and is mentioned only in Bryson's notes of 1930 and 1932. At that time, however, *Conoderus* and *Heteroderes* were still considered as separate genera and some additional information on *Conoderus* is available in the papers of Eagerton (1925) and of Cockerham and Deen (1936) which discuss the biology of two "*Heteroderes*" species.

Since 1940, the biology of some species of *Conoderus* has become better known in North America, chiefly through the work of Jewett (1944, 1945, 1948). But he has not discussed *Conoderus vagus* Cand. The notes which follow are a preliminary report on studies conducted at the Potato Investigations Laboratory at Hastings, Florida, during the period of March 1952 - July 1953.

TEST TUBE METHOD OF REARING WIREWORMS

Glass containers for rearing wireworms have been used by other investigators. Rawlins (1937) transferred wireworm prepupae into glass vials and then filled the vials with moist soil. Thus he was able to observe the pupal stage. Among other laboratory facilities employed in wireworm studies, Rawlins mentions also petri dishes being "... usually used as breeding cages" and "rearing cages". To the author's best knowledge, there are no previous records of rearing wireworms in test tubes.

Test tubes for housing wireworms (Dobrovsky, 1952) are filled with moist soil to a depth of five or six centimeters. A single newly-hatched larva is then introduced into each tube. An easy way to accomplish this is to place the tiny larva first on a small potato cube, then to lower the cube and larva into the container with the aid of forceps. A normal wireworm larva, tiny as it may be, finds the soil easily. On the next day the

¹ Florida Agricultural Experiment Station Journal Series, No. 280.

potato cube may be removed and a moist kernel of corn whose seed base has been cut off to expose the germ is given for food. The germ-side of the seed is pressed slightly into the soil for best results. Moist wheat may be used instead of corn. When potatoes are used as food, they are cut in small cubes. A plug of cotton inserted into the mouth of the test tube serves well for a stopper. Test tubes, thus stocked, are labeled and placed upright on a rack or in any deep container with a soft bottom. Friction-top tin pails are quite satisfactory for this purpose because stocked test tubes kept in them do not dry out rapidly when the lids are pressed in place; when water is needed, it is added to the soil with an eye-dropper.

Almost any size test tube can be used in rearing wireworms, but for making observations on the behavior of laboratory specimens of *C. vagus*, a test tube with a diameter of 10 mm. was best. The larva of this species, when full grown, is 12 - 14 mm. long, and, while it does not appear to suffer from cramped quarters in this size test tube, it is forced to do a considerable amount of tunneling next to the glass. The larva is thus exposed for observations a relatively large part of the time.

When feeding records are to be made, kernels of grain or cubes of Irish potato are inspected by removal from the test tube with a pair of forceps. A potato cube may also be pierced with a large dissecting needle and withdrawn.

The intervals between inspections are determined by factors such as type of diet and nature of information sought. When larvae are fed corn, for instance, one kernel supplies enough food for one to three weeks, depending on the size of the larva, on the temperature, or on the biological disposition of the larva at the moment. On the other hand, when cubes of potato are being fed at summer temperatures, inspection and changing of food are necessary at least every two days, because the potato cube rots or molds easily during warm weather. If behavior is to be observed, the shorter the intervals between inspections, the greater the possibility of seeing the larva perform its various functions.

Counting of instars accurately can be done quite easily by the test tube method of rearing. The contents of the test tube are first emptied on a sheet of white paper, then the larva is found and removed. The soil is now dumped into a 100 cc. beaker or a similar container half full of 70% alcohol. The entire contents quickly sink to the bottom of the container, but the

cast skin floats on the surface of the alcohol. After taking the necessary records, new soil is placed in the empty test tube, and the larva is returned to its quarters.

When pupation is completed in a test tube and the adult is not needed for breeding, it can be preserved together with its own pupal and last larval skin by the same flotation method. It is necessary to make sure that the beetle does not escape, as newly-emerged ones are lively. If any difficulty is encountered in this respect, a few drops of ether or chloroform on the cotton plug of the test tube will slow down the beetle quickly. The entire contents of the test tube are then emptied into the flotation alcohol. While everything else drops to the bottom, the beetle, its own pupal skin, and its last larval skin, float to the surface of the alcohol. They are collected and placed together in an individual vial of alcohol properly labeled for future reference. If the adult is needed for breeding purposes, it is removed, and only the larval and the pupal skins are floated.

TEST TUBES FOR MATING

Test tubes 10 mm. in diameter are used also for breeding purposes. The tubes are prepared with soil and cotton plugs as for larvae. Then four or five beetles are transferred into each "mating test tube". Since the sex of the adults can not be determined without time-consuming individual examinations, groups of four or five provide a higher probability that both sexes may be brought together than do single pairs. A larger number of beetles of this species causes overcrowding.

Oviposition can be maintained at a satisfactory rate only if the beetles receive a proteinaceous food. Best results were obtained with a diet of sweetened water and yeast. Either sugar or honey may be used for sweetening. A satisfactory formula is about 10 grams of sugar or honey in 100 ml. of water. Only pure powdered yeast was used in these studies. Jewett (1944) used "a 5 percent solution of brown sugar and water to which a small amount of baker's yeast was added".

The method of feeding the sweet-water-yeast mixture is the following: Four or five drops of the sweetened water are placed on a strip of blotting paper about 4 cm. long and 5 - 6 mm. wide. Then enough powdered yeast to absorb the excess liquid is placed on one side of the blotter with a spatula. This makes a small mass of yeast with the consistency of a thin paste on the surface of the blotter. The blotter is then lowered into the test

tube with forceps and allowed to rest on the soil. The paper should be stiff enough to stand straight so that the beetles may climb on it. A new blotter with sweetened water and yeast is needed at least every two or three days. In hot weather, it is often necessary to replace it daily.

Eggs are laid in the upper part of the soil. The following method is used in collecting the eggs. The beetles are first transferred into a new test tube with soil. Then the soil of the first test tube is emptied on a smooth sheet of paper and spread in a thin layer. A "reading glass" is helpful in spotting the eggs. After some practice, one acquires considerable skill in differentiating between eggs and grains of sand or other white particles in the soil. This method permits also the hatching and keeping of many larvae in one test tube, thus it provides opportunities for making observations on cannibalism among them. One group of five adults kept in a test tube and fed sweetened water and yeast lived and oviposited for approximately six months (Dobrovsky, 1953a).

As in the case of adults, the problem of larval nutrition is important. Rawlins (1937) recognized it fully when he stated: "The food requirements of young wireworm larvae needs further investigation, for our present knowledge is contradictory and incomplete." Jewett (1944, 1945, 1948) reared many specimens of three *Conoderus* species on sprouting wheat. He does not mention mortality rates, thus it is not possible to judge about the balance of this diet. It has not been tested in this laboratory yet, nor has a completely satisfactory diet for young larvae been found.

In a preliminary experiment with diets for *Conoderus vagus* larvae, 106 young specimens were placed in individual test tubes. The history of each of these larvae was recorded from day to day for the first five months, and once a week thereafter. All of these larvae received only potato for food after they were isolated in individual test tubes. However, prior to their isolation, some of these larvae were kept in test tubes with other larvae during which time they may have obtained one or more cannibalistic meals. Table 1 gives a summary of the fates of the larvae in this experiment in relation to whether or not they had practiced cannibalism.

The figures in Table 1 demonstrate that young larvae of *C. vagus* are unable to grow and develop without some protein; potatoes alone are totally inadequate for the growth of newly-

hatched larvae. Even only a few cannibalistic meals after hatching of the larvae may furnish food for growth to nearly full size and prolong their lives to over three hundred days. The fact that one specimen with a history of cannibalism completed its life cycle on this diet would further strengthen the emphasis on protein early in larval life. On the other hand, full grown or nearly full grown larvae which have had a normal diet in nature when brought into the laboratory, can complete their development on Irish potatoes alone (Dobrovsky, 1953b).

TABLE 1.—SUMMARY OF THE HISTORIES OF 106 SPECIMENS OF *Conoderus vagus* CAND. OBSERVED IN THE LABORATORY BY THE TEST TUBE METHOD.

	Com- pleted Life Cycle	Did not Complete Life Cycle Died in					Totals
		1-29 Days	30-99 Days	100-199 Days	200-299 Days	300 or More Days	
Total Number of Specimens	1	65	10	12	16	2	106
Number of Test Tube Specimens Believed to Have Been Cannibals	1	1	5	9	15	2	33
Percent Cannibals	100.0	1.5	50.0	75.0	93.0	100.0	31.1

OBSERVATIONS ON BEHAVIOR

TUNNELING OF LARVAE.—When wireworms are introduced into test tubes, they promptly burrow into the soil. An inspection on the following day usually shows many tunnels next to the glass. They traverse the soil column in every direction, forming a network. These tunnels remain permanently in place as long as the soil in the test tube is undisturbed. The larva uses them as regular travel routes in which it crawls either forward or backward. Locomotion in either direction seems quite natural for the larva in any of the tunnels. When using an outside tunnel, the larva may crawl either on the soil or on the glass. Newly hatched larvae or ones in the early instars seem to tunnel next to the glass with the same ease as older larvae.

FEEDING BEHAVIOR OF LARVAE.—The following observations were made on several occasions when larvae of *C. vagus* were given small cubes of potato placed on the surface of the test tube soil. With mandibles wide open, a larva approaches the potato cube, sinks its mandibles in the flesh of the potato and pulls. The pulling action is executed by anchoring the posterior end of the body on the substratum and backing up with the thoracic legs. It pulls in this manner until it tears off a piece of potato. As the larva chews, the mandibles and maxillae move in a lateral direction while the labium slides forward and backward. After chewing for a while, another piece is broken off.

Since a larva does not have any control over the size of potato piece it may tear off, it chews only on part of a large piece, allowing the remainder to protrude between and above the mandibles. The excess is eventually cut off and discarded.

Other manners of feeding have been observed in test tubes. A larva may move up to the piece of potato, sink its mandibles in the flesh, but instead of pulling, may remain in contact with the potato cube and work its mouth parts in chewing manner. Then it may withdraw and continue chewing. At other times, once the larva has brought its mouth parts in contact with the potato, it remains there for some time during which its mouth parts work continuously. After one or two minutes of such chewing, some potato pulp appears protruding dorsally between the mandibles. As the larva keeps feeding, the pulp grows into a long, white, cord-like mass. On one occasion this process was observed in progress without interruption for slightly over fifteen minutes during which time the resulting pulp cord grew about 8-10 mm. long. That larva continued feeding in this manner for about 4½ hours with only brief interruptions.

The last method of feeding described above indicates that larvae of *C. vagus* do not swallow all of the potato tissue which they may chew. There are three possible processes involved in their feeding to explain the discarding of pulp: either only the liquid portions are extracted and swallowed; or in the chewing process, some "predigestion" may occur by which some of the solids are liquefied and then swallowed; or some solids are broken down mechanically into minute fragments and are swallowed together with liquids extracted from the potato, while the coarser solids are rejected in the form of pulp, as observed above.

Apparently, *C. vagus* larvae are able to discriminate to some extent among the physical characteristics of the things which they swallow. In that respect, this species may resemble some other wireworms. According to Woodworth (1938), larvae of *Limonius canus* Lec. have a rather elaborate oral mechanism which can regulate the swallowing of solids of different particle sizes, and may even be "sufficient" to discriminate between desirable and undesirable liquids. The extent to which *Conoderus vagus* resembles *Limonius canus* in this respect is not known.

PUPATION BEHAVIOR IN TEST TUBES.—A few days before the prepupal stage sets in, the larva of *Conoderus vagus* feeds voraciously. Then it suddenly stops feeding and spends about two days making a pupal chamber. Sometimes it takes a small amount of food while the chamber is under construction.

Most of the larvae which have pupated in test tubes in this Laboratory have selected the soil near the bottom of the test tube for the locale of their pupal chambers. Thus, of a group of 22 specimens, 19 pupated in the lower part of the soil column, one in the middle of the soil column, and two in the upper half. In this group of specimens, 18 of the pupae were visible through the glass, most of the time without soil obstructions.

The size of the pupal chamber of *C. vagus* is somewhat variable. It may reach 21 mm. in length, 10 mm. in width, and 7 mm. in depth. These dimensions approach the upper limit. More typical chambers measure about 12 x 7 x 5 mm. The shape of the pupal chamber inside the test tube is also variable. It may be a roughly spherical or pear-shaped pit, or it may resemble a wide tunnel.

From one to three days before turning to pupa, a larva becomes sluggish, then motionless and finally pupates. Pupation in test tubes occurred from 2 to 9 days after completion of the pupal chamber. Pupal periods of 4 to 12 days were recorded. The pupa usually lies on its back but sometime on its side. When disturbed, it makes rapid and violent snapping motions with its abdomen.

BEHAVIOR OF ADULTS IN TEST TUBES.—When the adult emerges, it remains in the pupal chamber for several days. The beetles are vivacious, and in the test tubes used in these studies, they made quick darting runs in the space above the soil. On occasions, beetles were seen darting back to the soil and in a matter of seconds digging themselves to the bottom of the test tube.

When several virgin beetles were to be assembled in one test tube for mating purposes, their vivacious nature made their transfer difficult. A light exposure to ether subdues them long enough to make the transfer and prevents the loss of any specimens.

Mating has not been observed in test tubes thus far. On one occasion a pair was seen in mating position but the beetles separated as soon as the test tube was disturbed. It has been demonstrated that parthenogenesis does not occur in the elaterid *Limoniuss canus* Lec. (Woodworth, 1942). If we assume that the same is true for *Conoderus vagus*, then we must conclude that mating takes place in test tubes judging from the numbers of viable eggs and young larvae obtained by this method.

SUMMARY

A method using test tubes for rearing wireworms in the laboratory is described. Full grown and nearly full grown larvae of *Conoderus vagus* Cand. collected in potato fields completed their development in test tubes when fed only Irish potatoes. Newly hatched larvae, fed Irish potatoes exclusively, lived usually not more than 30 days. Similar larvae which had obtained a few cannibalistic meals survived much longer, but failed to complete their development if after their limited number of cannibalistic meals they were fed only Irish potatoes. In one case a specimen, allowed to practice cannibalism for several days and then placed on a potato diet, completed its development in 10 weeks. The germ of seeds such as corn and wheat apparently furnishes food for growth. However, mortalities have been high under this diet, and it has given erratic results.

Some observations on the behavior of larvae, pupae, and adults kept in test tubes are given. Tunneling and feeding of larvae, preparations for pupation, and the behavior of adults are mentioned.

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NOTES ON SOME AMERICAN VELIIDAE (HEMIPTERA),
WITH THE DESCRIPTION OF TWO NEW MICROVELIAS
FROM JAMAICA

CARL J. DRAKE¹ and ROLAND F. HUSSEY²

Several veliid species of the American tropics occupy an ecological niche which is very different from the ones where the great majority of their congeners are found. Instead of living, like their fellows, on the surfaces of ponds or streams, they dwell in the small pockets, filled with rain water, at the bases of the leaves of certain bromeliaceous plants. The bromeliads in question are sometimes epiphytes, growing on forest or other trees, sometimes ground plants growing directly on the rocks or soil. Three such veliid species have been known before: these are treated below, and a fourth one is described herewith.³ All of these are very pretty forms, and are strikingly marked with white.

The present paper also contains the description of another *Microvelia* which lives near shore on running water, together with comparative notes on a related species; and one name is reduced to a synonym. For comparative purposes, the same magnification was used for all measurements in the following descriptions, with 80 units equal to one millimeter.

Velia recens Drake and Harris

Velia recens Drake and Harris, 1935, Proc. Biol. Soc. Wash. 48: 192.

When this species was described from Panama the authors knew nothing of its habits. Recently Drake and Maldonado Capriles (1952, Great Basin Nat. 12 (3-4): 47-48) reported the finding of *V. recens* in the water pockets of bromeliads in the Amazonas region of Venezuela; and to this it was added that no specimens were found on nearby pools. The British Museum has many specimens of this species taken from bromeliads on mangrove in the Bartica Triangle, October, 1948, to March, 1949, by D. J. Atkinson. In May, 1950, Dr. José C. M. Carvalho took six specimens of *V. recens* from water pockets of a brome-

¹ Iowa State College, Ames.

² University of Florida, Gainesville.

³ *Microvelia ancona* Drake and Chapman, a fifth species with similar habits, is described elsewhere in this issue of THE FLORIDA ENTOMOLOGIST.

liad about 10 meters above the ground, at Eirunepe, Rio Juruá, Amazonas, Brazil.

***Microvelia distanti* Lundblad**

Microvelia insignis [n. preocc.] Distant, 1912, Ann. Mag. Nat. Hist. (8) 10: 437, Pl. X, figs. 4, 5.

Microvelia distanti [new name] Lundblad, 1933, Arch. Hydrobiol., Stuttgart, Suppl. 12: 286.

This species was described from specimens collected in bromeliads on the summit of El Tucuché, elevation 3,100 feet, in the northern part of Trinidad, and Distant reported one additional specimen from Dominica, B. W. I. The following descriptive notes are based on three apterous topotypes from El Tucuché, elevation 3,000 feet, collected February 25, 1940, by Dr. E. MacC. Callan.

Deep velvety black; first three segments of connexiva testaceous to orange-testaceous; first two visible tergites of abdomen quite bluish. Lengths of antennal segments: I, 20; II, 14; III, 20; IV, 30. Pronotum large, wider than long (55:35), broadly rounded behind, not covering all of mesonotum at sides or narrow posterior margin of metanotum; surface smooth above, not scabrous, without median carina. Wing pads not present.

***Microvelia laesslei*, n. sp.**

Slightly longer than *M. distanti* Lundblad, very differently colored, and with different proportions of the antennal segments.

MICROPTEROUS FORM. Small, rather slender, nearly parallel. Dark fuscous; head and much of pronotum brown or faintly reddish-brown; wing pads small but very conspicuous, snowy white, reaching only to base of second abdominal tergite; beneath dark fuscous, sometimes brownish on middle of venter, usually with considerable bluish tinge; dorsal surface with numerous very small bluish spots; head and pronotum with minute, sparse, scale-like, golden hairs; pronotum variable in amount of infuscation, sometimes nearly two-thirds darkened. Legs pale testaceous, tips of femora and tips of tarsi slightly infuscated. Antennae testaceous, third segment and basal part of fourth sometimes slightly embrowned.

MICROPTEROUS MALE. Length 2.28 mm., width 0.80 mm. Head almost one-third shorter than its width across eyes, very strongly convex above, with distinct median furrow. Antennae moderately long, clothed with very short, pale hairs, and with some longer erect hairs on each segment; first segment moderately stout, slightly curved; second segment slender at base, increasingly thick toward its apex where it is but little thinner than first segment; third and fourth segments very slender, subequal to one another in length and in thickness; lengths of segments: I, 20; II, 13; III, 26; IV, 26. Legs moderately long and moderately stout, hind femora stoutest, fore femora not much thinner, middle femora somewhat more slender; all

trochanters, femora, and tibiae unarmed; fore tibiae with a short, dark comb projecting slightly beyond apex; all tibiae with somewhat longer hairs on under side; hind tibiae usually lightly but distinctly curved on basal third, the apical two-thirds thicker, straight, cylindrical, and often rather thickly clothed below with hairs which are about as long as thickness of tibia; middle tibiae less evidently curved near base, and with less dense pilosity on distal two-thirds below. Measurements of fore legs: femur, 52; tibia, 40. Middle legs: femur, 58; tibia, 52; tarsus I+II, 12+16. Hind legs: femur, 65; tibia, 52; tarsus I+II, 10+14.

Pronotum large, wider than long (65:42), as long as head, broadly rounded behind, but entirely covering rest of thorax; sides nearly parallel before the lightly prominent humeral angles, then convexly rounded and converging in front; surface scabrous, coarsely and deeply punctate on basal two-thirds, impunctate in front except for a row of pits behind front margin; median carina fairly distinct, with only one or two punctures. Abdominal tergites very gradually narrowed posteriorly; last tergite a little longer than the preceding one, about three-fourths as wide as the first entirely visible tergite, its hind margin sharply truncate. Connexiva moderately wide, obliquely reflexed; outer margins very gently rounded, almost straight. Venter without spine or tubercle. Genital segments small, usually retracted and largely concealed (specimens mounted from alcohol).

MICROPTEROUS FEMALE. Usually slightly shorter and very slightly more robust than micropterous male. Connexiva scarcely wider than in male, reflexed as in male, not turned in over the tergites. Antennae, wing pads, and general aspect very similar to the male; hind tibiae straight, cylindrical, hairs on their lower side not more conspicuous than elsewhere on the tibia.

MACROPTEROUS FORM. Length 2.30 mm., width 0.85 mm. Very slightly larger than micropterous form, the snowy-white basal part of hemelytra very strongly contrasting with the general dark coloration. Pronotum large, wider than long (70:60), nearly $1\frac{3}{4}$ times as long as head, slightly convex between humeral angles, posterior part triangular, with narrowly rounded apex; lateral margins straight, obliquely converging anteriorly, humeral angles a little less prominent than in micropterous form; surface coarsely punctate, median carina quite distinct. Hemelytra nearly or quite reaching apex of abdomen, dark fuscous, the basal one-third to two-fifths snowy white, rarely with a short, subobsolete, median pale streak at apex; costal margin shortly ciliated, veins of corium with a few short, erect hairs. Other characters as in micropterous form.

Holotype (micropterous male) and *allotype* (micropterous female): Christiana, Jamaica, B. W. I., elevation 3,000 feet, August 1952, collected from bromeliads by Dr. Albert M. Laessle, of the University of Florida, in whose honor the species is named. *Paratypes*: 7 micropterous and 21 macropterous specimens, taken from bromeliads in August and early September, 1952, at Christiana, Juan de Bolas (elevation 2,500 feet), and Mocho (elevation 2,000 feet), Jamaica. These specimens, together with numerous nymphs of all ages, were collected by Dr. Laessle in an investigation of the fauna of the rain-water pockets of

Jamaican bromeliads. Holotype and allotype are in the collection of C. J. Drake, paratypes in the collections of both authors and of the University of Florida (Florida State Museum).

Dr. Laessle investigated numerous species of bromeliads in various parts of Jamaica. This *Microvelia* was found principally in *Aechmea paniculigera* Griseb., and in species of *Hohenbergia* and of *Vriesia*. These are large bromeliads, sometimes holding as much as two liters of water; the *Aechmea* has relatively few leaves, and some of its individual axils may contain nearly one-third liter. The water in all these plants abounded with small arthropods of various kinds, among which were entomostracans, and larvae of helodid beetles, mosquitoes, and Chironomidae. These afforded a plentiful supply of food for the *Microvelia*.

The *Aechmea* and the *Hohenbergia* species are widely distributed in Jamaica, occurring often as epiphytes, but also growing directly upon rocks in exposed situations. The *Microvelia*, however, was found in them only in the central and west-central parts of the island, and only at elevations of 2,000 feet or more. *Microvelia laesslei* is not restricted to any one area in the plant, but occurs in the water pockets from the outermost to the innermost whorl of leaves.

Even the youngest nymphs are strikingly banded with white across the basal segments of the abdomen, simulating the broad white marks on the hemelytra of the fully winged form, or the white wing pads of the micropterous form. No truly apterous individuals have been seen.

Microvelia oaxacana Drake

Microvelia oaxacana Drake, 1951, Great Basin Nat. 11 (1-2): 37-38.

MACROPTEROUS FORM. Moderately large; brownish, the hemelytra marked with pearly white. Pronotum moderately convex, dark reddish fuscous, the anterior border tinged with orange; without median carina or stripe; wider across humeri than median length (82:65), humeri very little elevated; pubescence short, golden. Hemelytra dark fuscous, with the following pearly white marks: a long stripe in outer basal cell, one or two shorter stripes in inner basal cell, one or two short marks near inner margin, one or two spots in discal cell, a larger spot on outer cell adjacent to discal cell, and a large apical spot in apical cell extending onto outer margin of membrane; membrane with apex and apical part of sides densely fringed with short brownish hairs. Other characters as in apterous form.

This species was originally described from apterous specimens, taken from bromeliaceous plants from Oaxaca, Mexico,

and from Ciudad Victoria, that were intercepted by federal plant inspectors at New York, N. Y., and Laredo, Texas. Many other specimens, of both apterous and macropterous forms, were found in bromeliaceae from Mexico City, D. F., by federal plant quarantine inspectors at Laredo, Texas, May 9, 1951.

***Microvelia cinchonana*, n. sp.**

Belongs to the *americana* group, with pronotum (apterous form) not produced backward. Male and alate forms unknown.

APTEROUS FEMALE. Length 2.55 mm., width 1.12 mm. Head, dorsal surface of thorax (except short, transverse, submarginal, orange band on pronotum) and abdominal tergites velvety black, faintly tinged with brownish; body beneath blackish fuscous, with scattered silvery hairs, rather uniformly tinged with bluish. Connexiva entirely yellowish-brown above and below. Head beneath, and all acetabula, coxae, and trochanters, pale testaceous. Rostrum testaceous, its last segment and a median streak on the preceding one dark ferrugineous. Leg testaceous, slightly darker above.

Head with the usual impressed dark median line. Antennae long, very slender, sparsely clothed with short, pale pubescence, brownish, basal segment pale; lengths of segments: I, 30; II, 25; III, 29; IV, 38. Width across eyes .70 mm. Lengths of middle legs: femur, 70; tibia, 62; tarsus I+II, 18+22. Hind legs: femur, 80; tibia, 104; tarsus I+II, 18+22. Last abdominal tergite without long hairs on hind margin; last ventrite less than twice as long as the preceding one.

Holotype (female): Cinchona, Jamaica, Feb. 4, 1911, in collection of C. J. Drake.

This species can be distinguished from other members of the *americana* group by the velvety black color, the wholly yellowish brown connexiva, and the long, slender antennae.

***Microvelia paludicola* Champion**

Microvelia paludicola Champion, 1898, Biol. C. Amer., Het. 2: 127, Pl. 8, fig. 13.

Microvelia alachuana Hussey and Herring, 1950, Florida Ent. 33(3): 117.
NEW SYNONYMY.

Microvelia paludicola also occurs in Jamaica. Its antennal structure differs from that of *M. cinchonana*, n. sp., and the female has a dense row of moderately long hairs on the hind margin of the last abdominal tergite.

This row of hairs also occurs on the female of *M. alachuana*, and the male genital segments of this form are like those of *paludicola*. *M. alachuana*, described from northern Florida, seems at most to be a local race of *paludicola*, with pale-banded

antennae whose fourth segment is relatively longer than in Champion's types from Guatemala. Dr. R. J. Izzard has very kindly compared paratypes of *alachuana* with the types of *paludicola* in the British Museum; and while he feels that they may be distinct species because of the difference in antennal structure, it seems that this character is subject to some variation.

NOTES

FORCIPOMYIA SPLENDIDA WIRTH IN FLORIDA.—A specimen of *Forcipomyia splendida* Wirth was among a group of insects attracted to a lighted window the evening of February 17, 1954. It was collected with an aspirator by the writer at a country dwelling about nine miles northeast of Gainesville, Florida. The specimen has been identified by Dr. W. W. Wirth of the United States National Museum. He writes that it is a new record for Florida, and the first south of Tennessee.

FRANK W. MEAD,
State Plant Board of Florida

REPORT ON A COLLECTION OF MALLOPHAGA, LARGELY MEXICAN (PART I)

M. A. CARRIKER, JR.

This paper is the first of several dealing with a collection of Mallophaga in the Louisiana State University Museum of Zoology. These lice were taken mostly from birds collected in the state of San Luis Potosí, México, in 1946-1947, by various persons connected with that museum.

This report lists all species in the collection which can be identified and includes critical notes on the known forms and descriptions of those which appear to be new to science. The types of all new forms have been returned to the Louisiana State University Museum of Zoology, but paratypes, when available, have been retained in the author's collection, along with duplicates of other species when represented by sufficient series.

All measurements are in millimeters, and all drawings have been prepared by the author. The drawings have all been made as accurately as possible by the use of the eye-piece micrometer. Whenever there has been any doubt as to the accuracy of any detail, mention is made of this fact. Such doubts have sometimes arisen in the case of poorly prepared specimens or specimens with extraneous food matter within the body that obscures vision.

Superfamily AMBLYCERA

FAMILY MENOPONIDAE

GENUS *Actornithophilus* FERRIS

Actornithophilus hirsutus, n. sp.

(Figure 1)

Type female adult, from *Ereunetes pusillus* (Linn.), collected by D. S. Farner at Lawrence, Kansas, U. S. A., May 25, 1946.

DIAGNOSIS.—Does not resemble any of the known species of the genus thus far recorded from the sandpipers. The head is rather small, with narrow, rounded temples and with the manner of attachment of the head with the prothorax rather unusual and difficult to explain (see figure). The ocular blotches are small and rounded, with darker shading inward to the oval clear spot, in which is set a stout spine, and with shading also extending backward to the occiput. The gular plate is quadrangular, longer than wide, and does not fill the dorsal clear area above it; there are four setae

on each side of the gular plate, the two anterior ones short and the two posterior ones long.

The thoracic sternal plates are of the same general type as in the various species that I have seen from the Charadriiformes, but differ slightly in detail and chaetotaxy. The complete chaetotaxy of the metasternal plate is not visible. There is a clear line at the suture between the meso- and metathorax, with an unusual lateral constriction at this point, while the lateral dorsal band connecting the metathorax with the abdomen is strongly developed (see figure).

The pleurites are wider ventrally than dorsally and deeply colored but entirely devoid of darker markings. The tergites are rather deeply colored, entire across abdomen, but separated from the pleurites by a narrow clear space. The sternites are also rather heavily chitinized and are separated from the pleurites by a wide clear area on segments II to VIII. There is a small, oval, single sternite in the posterior portion of IX, with a single row of fine setae on posterior margin; the tip of segment IX is clear, with a dorsal fringe of fine setae. There is a line of strong hairs across posterior margin of tergites II to VII which reaches but little beyond the middle of the succeeding segment, and another line of 8 shorter, stout hairs across the middle of the same tergites. Segment VIII has but 8 marginal hairs and 6 in the middle. Sternites I to VIII have a scattering of very short, but coarse, setae set sparingly over their entire surface, with the usual patch of fine setae on III and a slight patch on IV. The species is represented only by the female holotype.

MEASUREMENTS OF THE TYPE:

	Length	Width
Body	2.02	—
Head	.37	.456
Prothorax	.174	.35
Mesothorax	.12	.39
Metathorax	.152	.49
Abdomen	1.30	.64

Actornithophilus albus Emerson, 1948

Ent. News, vol. 59, p. 178, figs. 1, 2. Host: *Crocethia alba* (Pallas). *Nom. nov.* for *Colpocephalum spinulosum minor* Kell. & Chap., 1899, preoccupied by *C. minus* Piaget, 1880.

One male and two females were taken on *Erolia fuscicollis* (Vieillot) at Lawrence, Kansas, by George H. Lowery, May 11, 1947. These specimens have been very carefully compared with Col. Emerson's redescription of the species and his figures, and with females from the type host in the author's collection; and they prove to be exactly the same. It is possible that there was some error in the labelling of the specimens from Kansas, or that they were stragglers from *Crocethia alba*, since I hardly think it probable that these two hosts would have the same species of *Actornithophilus* parasitic on them. Until additional authentic material from *Erolia fuscicollis* has verified this record, I prefer to leave the matter of the host as questionable.

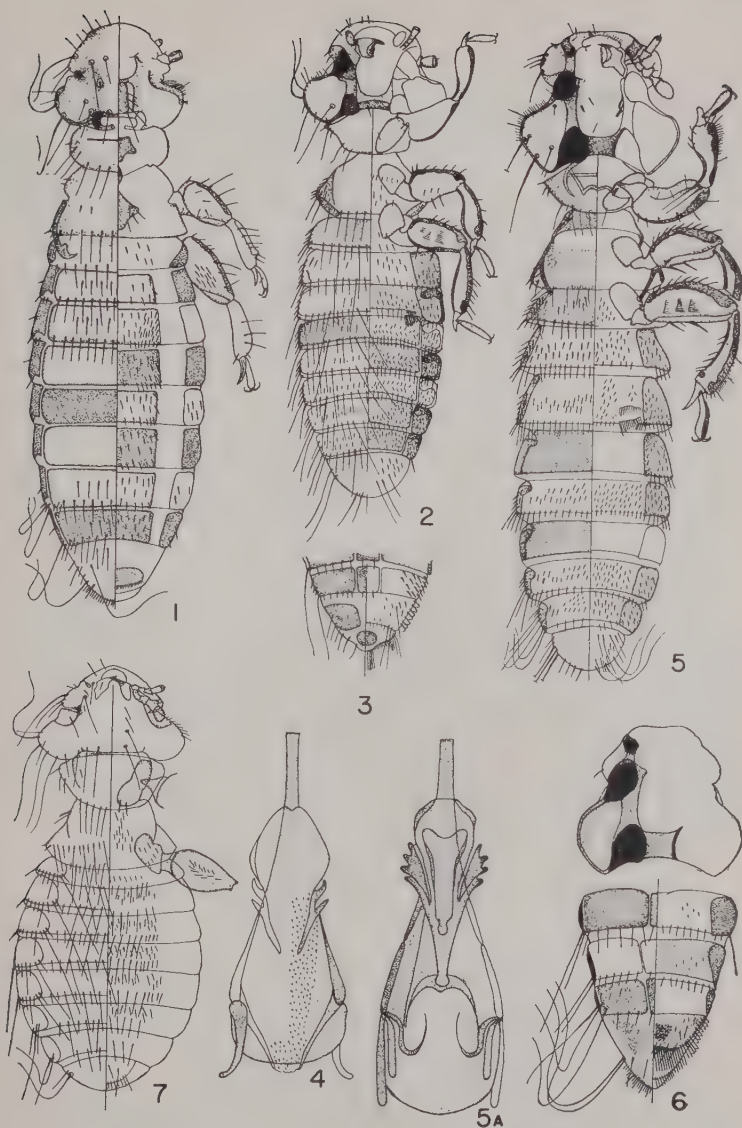


Fig. 1. *Actornithophilus hirsutus*, female
 Fig. 2. *Colpocephalum fusconigrum* Giebel, male
 Fig. 3. *C. fusconigrum*, female, tip of abdomen
 Fig. 4. *C. fusconigrum*, male, genitalia
 Fig. 5. *C. scalariforme* Rudow, male
 Fig. 5a. *C. scalariforme*, male, genitalia
 Fig. 6. *C. scalariforme*, female, head and tip of abdomen
 Fig. 7. *Plegadiphilus plegadis* (Dubinin), female

Actornithophilus mexicanus Emerson, 1953¹

Host: *Himantopus mexicanus* (P. L. S. Müller).

There are two females in the collection. They were taken on the type host collected by Robert J. Newman at Tamuín, San Luis Potosí, México, November 17, 1946. These have been compared with the paratype female sent to me by Col. Emerson and with specimens taken by myself in Mexico in 1930 and are identical with them.

Actornithophilus flavipes (Giebel), 1874

Colpocephalum flavipes Giebel, Insecta Epizoa, p. 276. Host: *Squatarola squatarola* (Linn.).

A single female of this species was taken from the type host collected by Charles Shaw at Ebano, San Luis Potosí, November 1, 1946. I have compared this female with material in my own collection from the type host and find it to be identical.

Ciconiphilus femoratus (Piaget), 1885

Colpocephalum femoratum Piaget, Pediculines Suppl., p. 124, pl. 13, fig. 7. Host: *Mycteria americana* (Linn.).

There are two males from the type host, taken at Tamuín, San Luis Potosí, November 17, 1946, by Charles Shaw. Hopkins & Clay (*Checklist of Mallophaga*, 1952) doubt the correctness of the host for this species. I have compared this male with Piaget's description and figure, and they seem to agree very well, and I see no reason to doubt the validity of the host. There is another species of this genus, *C. maculipes* (Giebel), listed as from *Mycteria americana*, but all the knowledge we have concerning it is a brief description by Giebel (without figure) and a translation of the same by Piaget (*Pediculines*, p. 488). According to these descriptions the present specimen cannot possibly be *C. maculipes* (Giebel).

Colpocephalum fusconigrum Giebel, 1874

(Figures 2, 3 and 4)

Insecta Epizoa, p. 274. Host: *Guara alba* (Linn.), *nec* Piaget, *Pediculines*, 1880, p. 555, pl. XLVI, fig. 4.

Two males and two females were taken on the type host, collected at Tamuín, San Luis Potosí, September 16, 1946, by Charles Shaw. These specimens agree fairly well with Giebel's description of the species, but not at all with that given by Piaget and his figure. Piaget gives as hosts for the species both "*Ibis*" *alba* and *I. melanocephala*, but there is nothing to indicate from which host the species was figured. He further says that Giebel's description, taken from a single male in poor condition, is incorrect.

There is no question as to the correctness of the host for the Mexican specimens, and the only explanation I can offer for the difference between

¹ A description of this species has been published, and I have not as yet received a copy of it, but Col. Emerson sent me a female paratype.

them and Piaget's figure and description is that he described and figured a specimen from "*Ibis*" *melanocephala* instead of from "*Ibis*" *alba*, which was most likely a different species.

I can find no note in literature by either Clay, Hopkins or Thompson regarding Piaget's type of this species. I herewith present a figure of one of the males which I have examined. A comparison of this with Piaget's figure will clearly show that they represent different species. I also give a figure of the apical abdominal segments of the female, which, as may be seen, are quite different from that given by Piaget.

Of course it is possible that there may be two distinct species of *Colpocephalum* parasitic on *Guara alba*, but this is hardly likely. I think that the real explanation of the difference between the two is that Piaget described and figured a different species whose host is *Guara melanocephala*. If this conjecture should prove to be correct, then Piaget's species is without a name.

The parasite here figured is a distinctive one and can be readily separated from closely related forms. The shape of the head, with its extensive pitchy brown markings, the shape of the thorax, and the general chaetotaxy are distinctive characters, as are also the features of the male genitalia.

MEASUREMENTS:

	Male		Female	
	Length	Width	Length	Width
Body	1.69	—	1.90	—
Head { <i>frons</i>	—	.32	—	.347
<i>temples</i>	.36	.51	.38	.52
<i>occiput</i>	.31	—	.326	—
Prothorax	.16	.355	.185	.347
Pterothorax	.24	.40	.27	.48
Abdomen	1.01	.52	1.19	.60
Basal Plate	.58	.097		
Paramers	.066	.097		
Endomera	.12	.066		

Colpocephalum ajajae Ewing

Proc. Biol. Soc. Washington, vol. 43, p. 126. Host: *Ajaia ajaja* (Linn.)

There is a single female of this species taken on the type host collected by Charles Shaw at Pujal, San Luis Potosí, October 30, 1946.

Emerson has published a note on the identity of this species, giving good figures of it (Bull. Brooklyn Ent. Soc., October 1948, p. 130). In my own collection there are 3 males and 1 female, also from the type host, collected in Costa Rica. They agree perfectly with Col. Emerson's figures and with the single Mexican specimen here listed.

Colpocephalum scalariforme Rudow, 1866

(Figures 5, 5a and 6)

Zeit. ges. NatWiss., vol. 27, p. 471. Host: *Mycteria americana* Linn.

There are one adult and two juvenile females of this species that were taken from the type host collected by Charles Shaw at Tamuín, San Luis Potosí, October 17, 1946. The specimens were compared with a good series of the species in my own collection, taken on the type host in Colombia, and were found to be the same. The only published information extant concerning this species is the very brief, very bad description by Rudow and the pungent remarks by Piaget concerning the same. There is, however, no doubt but that these specimens and my own series represent the species described by Rudow from this host.

The species is a large, very strikingly colored one, a typical *Colpocephalum*, with very large pitch-black ocular and occipital blotches, the latter connected by a wide band of dark brown, and the two black blotches connected also by a paler, brown band (see figure). The sexes are rather strongly dimorphic in the shape of the head, the shape of apical abdominal segments, and in the chaetotaxy of the whole abdomen. The pleurites, tergites, and sternites of the male are thickly set with short, thick bristles (see figure), which are almost wanting in the female. The tergites are deeply colored and continuous across the abdomen in the male, but in the female they are broken medially in V to VIII.

The chaetotaxy on the apical abdominal segment of the female is characteristic of the genus (see figure). The male genitalia seem to be unique. The basal plate is very long and very narrow (as in *fuscconigrum*), with the paramers *straight*, and the endomeral plate of a curious design, also somewhat similar to that of *fuscconigrum*.

MEASUREMENTS:

	Male		Female	
	Length	Width	Length	Width
Body	2.28	—	2.62	—
Head { <i>frons</i>	—	.434	—	.423
<i>temples</i>	.50	.575	.53	.586
<i>occiput</i>	.44	—	.47	—
Prothorax	.21	.39	.22	.40
Pterothorax	.28	.48	.28	.52
Abdomen	1.35	.564	1.70	.716
Basal plate	.79	.102 (at base)		
Paramers	.08	.102		
Endomera	.153	.071		

Colpocephalum unciferum Kellogg, 1896

Proc. California Acad. Sci., (2), vol. 6, p. 140, pl. 12, figs. 1-3. Host: *Pelecanus occidentalis californicus* Ridgway and *P. erythrorhynchos* Gmelin.

Two males were taken on *Pelecanus erythrorhynchos*, collected by Charles Shaw at Ajinche, San Luis Potosí, November 10, 1946. I have not been able to compare these specimens with material from the type host but have done so with a series of both sexes from *P. o. occidentalis*, collected by me in Colombia, and they are the same thing. Since the same parasite has been recorded from both *P. o. californicus* and *P. erythrorhynchos*, there is little doubt but that my specimens from *P. o. occidentalis* are all *C. unciferum* Kellogg.

***Dennyus dubius* (Kellogg), 1896**

Nitzschia dubius Kellogg, Proc. California Acad. Sci., vol. 6, p. 540, pl. 73, fig. 6. Host: *Chaetura pelagica* (Linn.).

Two males and a female of this species were taken from the type host, collected by Charles Shaw at Xilitla, San Luis Potosí, April 18, 1947. This species has been fully discussed, in connection with others of the genus, in a paper by the author now in press at the U. S. National Museum, so that no further remarks are necessary.

***Piagetiella peralis* (Leidy), 1878**

Menopon peralis Leidy, Proc. Acad. Nat. Sci., Philadelphia, 1878, p. 100. Host: *Pelecanus erythrorhynchos* Gmelin.

A series of 18 males and females was taken from the type host collected by Charles Shaw at Ebano, San Luis Potosí, November 10, 1946. This is a large, strikingly marked species and one easily recognized and well known. They are found attached to the lining of the throat pouch and feed either on the mucous lining of the pouch or on blood secured by piercing the membrane with their slender, sharp-pointed mandibles. The genus is also found in the throat pouches of various species of cormorants, as well as pelicans.

***Plegadiphilus plegadis* (Dubinín), 1938**

(Figure 7)

Menopon plegadis Dubinín, Trav. Réserve Etat Astrakhan, vol. 2, p. 178, fig. Host: *Plegadis* (f.) *falcinellus* (Linn.).

One adult female and one nymph were taken on *Plegadis* (*falcinellus*?) *chihi* (Vieillot) collected by Charles Shaw at Tamuín, San Luis Potosí, September 27, 1946. I have not had access to the original description and figure of this species, but I have compared the material with specimens of both *P. mammilatus* (Piaget) (from *Theristicus caudatus*) and with *P. threskiornis* Bedford (from *Threskiornis aethiopicus*), the only other known species of the genus.

Since the host on which these parasites were taken is now considered to be conspecific with *P. f. falcinellus* (Linn.), there is no reason to assume that the lice of *P. f. chihi* would be different from those on *falcinellus*. The present species is without doubt a *Plegadiphilus*, and although I have not been able to compare it with the description of *P. plegadis*, I assume from analogy that they are that species.

Since this is an interesting, little known form, the description of which is not easily available, I herewith present a figure of it, together with its measurements.

The single adult (?) female is not in the best of condition, being either recently moulted or cleared too much. The structure and chaetotaxy are clearly visible, but the markings, if any, are only faintly indicated. As may be seen from the figure, the pre-ocular slit is deep and well marked, while the dorsal integument of the head covers completely the antennary fossae. The pre-antennary portion of the head is wider than in the genotype, but the chaetotaxy of the head and body in general is very similar. It is unfortunate that no male was taken, for the genitalia of this genus are unique.

MEASUREMENTS OF THE FEMALE:

	Length	Width
Body	1.52	—
Head { <i>frons</i>	—	.358
<i>temples</i>	.347	.52
<i>occiput</i>	.31	—
Prothorax	.206	.38
Pterothorax	.25	.467
Abdomen	.836	.66

Myrsidea interrupta (Osborn), 1896

Menopon interruptus Osborn, Bull. U. S. Bureau Ent. (n. s.), 5, p. 245, plate II, fig. h. Host: *Corvus corone brachyrhynchos* Brehm.

A male and two females of this species were taken on the type host collected by R. Baker at Altair, Texas, December 11, 1938. I have compared these specimens with material collected by myself on the type host in Nebraska and find them to be identical.

Amysidea spicula spicula Carriker, 1950

Rev. Acad. Colombia Sci., vol. 7, p. 506, figs. 54 and 55a. Host: *Ortalis v. vetula* (Wagler).

A single male of this species was taken on a specimen of *Ortalis vetula mccalli* (Baird), collected at Xilitla by Robert J. Newman on February 13, 1947.

A careful comparison of this male with the type of *spicula* shows no differences worthy of mention and hence may safely be regarded as that species.

(To be continued)

A MUSCID FLY, *ATHERIGONA ORIENTALIS* SCHIN., A PEST ON CANTALOUPE

F. GRAY BUTCHER

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In May, 1953, a grower in the Miami region noted a small maggot associated with a rapid breakdown in the stem-attachment area of his cantaloupes. These melons were picked for shipping, so were not overripe, but the wet rot in the stem-end developed rapidly enough to result in heavy loss by the time the melons reached northern markets.

Investigation revealed typical dipterous maggots in the melons, tunnelling through the flesh at the stem-attachment wound. The larvae were found in the melons just as they came from the field, and elongate eggs were observed attached around the edges of the abscission area. Adult flies reared from these larvae were identified by C. W. Sabrosky, U. S. National Museum, as *Atherigona orientalis* Schin. In advising the writer of this identification, Dr. C. F. W. Muesebeck stated "we had supposed this form to live principally as a scavenger following damage by other insects or feeding upon overripe fruit." He referred this record to Dr. D. J. Caffrey of the Division of Truck Crop and Garden Insect Investigations of the Bureau of Entomology and Plant Quarantine, who advised that no record of damage from this species had previously been reported. Dr. Caffrey also quoted correspondence from Dr. Orin A. Hills of the Bureau's laboratory at Phoenix, Arizona, to the effect that the species had not been observed on cantaloupes in the Southwest. Further search of available literature has revealed no reference to this species as an economic pest.

Through the courtesy and cooperation of local melon growers¹ many fruits were brought into the laboratory directly from the field as they were picked for detailed life history studies and trials on possible control methods. For the latter, various insecticide and fungicide dusts were applied to the stem-end of the fruit. Of the different materials tested, a 20-80 copper-lime dust proved quite effective in preventing development of the larvae and protecting the fruit from the accompanying wet

¹ Charles Burr, Thomas Mitchell and J. N. Vernam generously permitted access to their fields for observations and collection of material. The author wishes to express, herewith, his appreciation to these men for their kind cooperation in this study.

rot. Several growers later reported that use of this material, applied with a soft brush as the fruit was packed, proved entirely satisfactory in preventing loss of fruit shipped.

Field observations revealed that the eggs of this fly were attached to the melons before they were picked. As soon as the abscission of the stem began, eggs were attached at this area. The fruit was considered ready for picking as soon as this abscission completely encircled the stem. Eggs were frequently found attached to the edge of the stem break as well as on the fruit edge of the abscission wound.

Adult flies collected in the field for life history observations were placed in small glass cages with a portion of ripe cantaloupe. As typical of such observations, the following record is from three female flies caged at 7:00 p.m. on July 24. Numerous eggs had been deposited along the edge of the cut surface of the fruit by 9:00 a.m. the following morning, when the flies were removed from the cage. First larvae were observed from these eggs at 9:00 p.m., July 25, with several eggs still unhatched. First maggots appeared full grown, as indicated by their extensive crawling through the cellulocotton in the bottom of the cages, at 9:00 a.m. on August 1, and first puparia were found completed that evening at 9:00 p.m. Adult flies emerged from these puparia on August 6, thus completing the life cycle. These observations revealed the minimum duration of the various stages of this fly as follows: egg incubation, 36 hours; larval stage, 7 days; pupal stage, 5 days.

These studies clearly indicate that this species is a primary pest on uninjured cantaloupes picked before they are fully ripe for shipping. The infestation is established in the field by egg deposition at the time of abscission of the stem from the fruit. The larvae begin feeding in the exposed fleshy area at the stem-end as soon as they hatch, and continuous breakdown in this area soon renders the fruit unmarketable. The fly is not limited in its development to this stem-end area. Numerous infestations of this species were observed in other wound areas, growth cracks, and overrip fruit discarded in the field.

Other species of this genus are listed in economic entomological literature. *A. exigua* Stein is known as the Rice Stem Fly in India. Cassava, sorghum and pineapple are other host plants for related species in various countries. However, no reference has been found to any species of the genus in the literature of North American economic studies.

A REPORT ON A CASE OF TICK PARALYSIS IN DADE COUNTY, FLORIDA

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In November, 1953, a case of tick paralysis in a six-year-old girl living in the southern part of Dade County, Florida, was reported by a local pediatrician. Although a very common disease of dogs in Florida, this is believed to be the first case of human tick paralysis in Dade County. The Florida State Board of Health has only one other record of human tick paralysis in Florida, but other cases may have occurred which were never reported. The single case on record with the State Board of Health occurred in the Jacksonville area in April, 1953. A small girl was also the victim in this case.

Briefly, a day-by-day account of the tick paralysis started with the frightened parents bringing the child to the home of the pediatrician on a Friday night. Both legs of the child were paralyzed. Naturally the parents and the pediatrician suspected polio. The symptoms did not indicate this disease as there was no rigidity of the spine as in polio—the child was able to bend from the sitting position and put her head between her knees. The child was taken to a hospital, where a lumbar puncture proved negative for the common, known paralytic ailments such as spinal meningitis. All of Friday night the physicians were puzzled as to the cause of the paralysis.

Saturday the paralysis continued ascending, causing the arms to be paralyzed. The girl could neither stand nor move her arms, and arms and legs were completely limp. The pediatricians soon realized the child was suffering from some type of ascending paralysis which begins at the extremities. Unless something was discovered soon, the respiratory centers would become affected and the child might die due to respiratory failure. Several experts from the various medical branches were called in to study the case.

It was on Saturday that a nurse, while tidying up her little patient, discovered a tick on the head of the girl. The tick was removed and the child began to improve rapidly. Sunday the little girl walked and on Monday was discharged from the hospital.

The writer was requested to identify the tick by the Dade County Health Department. The tick was identified as *Dermacentor variabilis* (Say), the American dog tick, and the identification was confirmed by Dr. George Bradley, Chief Entomological Consultant, Communicable Disease Center, Atlanta, Georgia.

Tick paralysis in humans, although rare in Florida, is commonly found in the western United States and Canada, adjacent to the Rocky Mountains. Numerous cases have occurred in Georgia and South Carolina. In North America the ticks involved are *Dermacentor variabilis* and *D. andersoni* and probably some of the species of *Ixodes*. The paralysis is caused by a toxin apparently secreted from the salivary glands of the pregnant engorged ticks. The removal of the tick brings about a rapid recovery.

The question as to how the tick became attached to the head of the child is still unanswered. The home of the child is located south of Miami in a high-pine, woody section. This woody area is located a few hundred feet to the rear of the house. The child has a dog and often put her arms around the neck of her pet and placed her head on the neck of the animal. Also, the mother stated the girl had gone to sleep on a couch, which is a frequent resting place for the dog. It is also possible that the tick could have been picked up by the girl as she played in the nearby woody area. No other ticks were located in the area or on the dog, which had been treated before the writer was able to examine it.

Local veterinarians reported tick paralysis to be common in dogs in Dade County. Some veterinarians reported treating over fifty such cases a year.

NEW AMERICAN WATERSTRIDERS (HEMIPTERA)

CARL J. DRAKE¹ and HAROLD C. CHAPMAN²

This paper is based upon a study of specimens in the U. S. National Museum and the collections of the authors. It contains the descriptions of three new species of Hebridae, one new Veliidae and one new Gerridae. The types have been deposited as stated under the description of each new species. The units of measurement employed in the characterizations of species are all to the same microscale, and may be converted into millimeters by dividing by 80.

Hebrus camposi, n. sp.

Head dark fuscous with some bluish pruinose bordering the eyes and at apex, with short golden pubescence, the median impressed line barely indicated; eyes reddish fuscous, coarsely faceted. Antennae slender, dark fuscous with first two segments testaceous, with scattered long hairs on last three segments, measurements—I, 14; II, 11; III, 19; IV, 15; V, 19. Rostrum long, fulvous with apical half flavous. Legs flavous, slightly darker at joints.

Pronotum dark fuscous, moderately clothed with short golden pubescence, without median longitudinal groove, with prominent humeral angles; collar crescentic, widest at middle, with a transverse row of deep pits along hind border; front lobe with two large pits (one on each side of median line) behind, then demarcated from hind lobe on each side by irregularly arranged pits; humeri impressed within so as to form a shallow longitudinal furrow. Scutellum rounded behind, without apical notch, without distinct median carina. Hemelytra as long or nearly as long as abdomen, with prominent dark fuscous veins, the veins and darkened apical part of corium and clavus with scattered golden pubescence; basal two-thirds of space between corial veins and basal part of clavus (two-thirds of length next to vein and only about one-half within) pearly white; membrane dark fumose, with three whitish spots (an elyptial apical spot and a smaller one on each side at middle), sometimes also another transverse whitish spot on each side of corium near apex. Apterous form unknown.

Length, 1.90-2.20 mm.; width, 0.78-0.81 mm.

Type (male) and *allotype* (female), Guayaquil, Ecuador, Oct. 20, 1952, Dr. F. Campos R., Drake Collection. *Paratype*; 1 female, taken with type; and 2 females, Guayaquil, C. L. Fagan, U. S. Nat. Mus.

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Separated from *H. plaumanni* Porter by the darker color, more slender antennae, pearly white markings at base of hemelytra, non-bifid apex of scutellum and flavous legs.

Hebrus tuckahoana, n. sp.

APTEROUS FORM: Very small, black, with a broadly U-shaped mark at base of head (arms extending anteriorly along sides of eyes) and the anterior and posterior margins of pronotum brown. Head moderately convex above, with a median longitudinal furrow, thinly clothed with very fine, reclining, pale hairs; eyes reddish brown, with large facets; bucculae long, pale testaceous. Rostrum long, testaceous; sulcus deep, uninterrupted between hind coxae. Antennae quite slender, pale testaceous, measurements—I, 16; II, 11; III, 17; IV, 10; V, 16. Legs pale testaceous, the acetabula brownish.

Body beneath black, thoracic pleura dark fuscous. Pronotum dark fuscous to blackish, scarcely more than twice as long as wide (50:22), nearly flat, with a transverse row of irregularly arranged large pits separating front and posterior lobes; front lobe short, not much narrower than hind lobe, with an encircling row of large pits at base of collar; hind lobe scarcely twice as long as fore lobe, with numerous large pits, truncate behind with outer corners obliquely narrowed, the humeral angles low, almost flat, not raised or prominent. Scutellum very short, much wider at base than median length (32:8), the apex very broad, subtruncate and nearly five-sixths as wide as the base. Pronotum and scutellum rather thinly clothed with very fine, decumbent, whitish hairs, these hairs not as numerous on tergites. Male and alate form unknown.

Length, 1.85 mm.; width, 0.82 mm.

Type (female) and one *paratype* (female), both apterous, Tuckahoe, New Jersey, June 2, 1953, Drake Collection.

Allied to *H. buenoi* Drake and Harris, but readily distinguishable by the pale hairy vesture of dorsal surface, especially pronotum, and slenderer antennae. The short-winged or apterous form of the common and widely dispersed *H. buenoi* is not represented in our collections.

Hebrus acapulcana, n. sp.

MACROPTEROUS FORM: Large, dark fuscous-brown with a large, sharply defined, pearly white patch at base of clavus, which extends posteriorly almost to apex of scutellum; membrane dark fuscous with four white marks; body beneath blackish with underside of head acetabula brownish flavus. Head black, without median longitudinal furrow or anastomosing rows of pits, with a little bluish lustre next to eyes; eyes reddish fuscous. Antennae testaceous with a little tinge of brown or fuscous; segments III, IV and V quite slender and rather longly hairy, measurements—I, 25; II, 15; III, 22; IV, 16; V, 20. Rostrum long, flavous, sulcus wide, shallow, dark (sometimes partly brown or flavous), not interrupted between hind coxae, venter not flattened beyond sulcus; sterna and rostral sulcus dark, moderately clothed with short pale hairs.

Pronotum much wider than long (90:50), with median longitudinal furrow rather narrow and not very deep, with front and hind lobe demarcated by an irregular row of large pits, clothed with very short, slightly flattened golden pubescence; fore lobe much narrower than hind lobe, with an encircling row of small pits at base of collar; hind lobe slightly convex, about three times as long as front lobe, with pits only partly visible, the humeri within set-off by a longitudinal impression; scutellum with apex broad, rounded and bifid, with lateral edges feebly raised, with median carina hardly distinct. Elytra nearly as long as abdomen, with corium and clavus black-fuscous, rather densely clothed with golden hairs, with hairs along outer edge a little longer, then shorter and not so numerous in pearly white part of clavus, without distinct median vein, with apical end strongly, sharply, obliquely truncate. Legs whitish testaceous with tips of femora, tibiae and tarsi slightly infuscate.

Length, 2.60 mm.; width, 1.12 mm.

Type (male) and *allotype* (female), Acapulco, Mexico, Aug. 3, 1951, Drake Collection. Paratypes; 2 specimens, same data as type. Closely related to *H. major* Champion, but readily separated from it by the dark and little elevated rostral lamina, the uninterrupted sulcus (between hind coxae) and the non-flattened venter just behind the rostral channel. The antennal measurements are slightly different, and the pearly white mark at the base of clavus is slightly larger.

Merragata brevis Champion

Merragata brevis Champion, Biol. Centr.-Amer., Rhynch., 2: 122-123, 1 fig. 1898.

Merragata brevis Drake and Harris, Not. Mus. La Plata, Arg., 8: 45-46. 1943.

Numerous specimens of this species were taken among growing emergent vegetation in quiet brackish and saline waters near the east coast of Florida. Specimens are at hand from Salt Lake (Mims) and the Indian River (between Cocoa and Indian River City). The species is also recorded in the literature from Texas and California. In the original description, Champion included specimens from Mexico, Guatemala, Panama. In addition to the latter records, Drake and Harris (1943) added Costa Rica.

Microvelia ancona, n. sp.

Small, oblong, velvety blackish fuscous with the basal two-fifths of hemelytra and a large apical spot pearly white. Head black, convex above, with an impressed, median, longitudinal, black line; eyes large, fuscous. Antennae moderately long, flavo-testaceous; segments I and II moderately stout; III and IV quite slender, with scattered long hairs; measurements—

I, 17; II, 12; III, 19; IV, 30, legs moderately stout, flavous, femora unarmed in female.

Pronotum pentagonal in outline, slightly convex above, rounded at apex behind, black-fuscous, without markings, longer across humeri than median length (70:50), without median longitudinal carina or impressed line. Hemelytra as long or nearly as long as abdomen; connexiva entirely dark fuscous, not testaceous beneath the basal pearly white part of hemelytra as in *M. distanti*. Body beneath dark fuscous. Male and apterous forms unknown.

Length, 2.10 mm.; width, 0.75 mm.

Type (female, macropterous), Ancon, Canal Zone, Panama, intercepted in bromeliad plants, at Loredo, Texas, Feb. 26, 1953, in U. S. National Museum.

Separated from *M. distanti* Lundblad by the concolorous connexiva, slenderer legs and slightly small size. In *M. distanti* the visible basal three segments of the connexiva (both dorsal and ventral surfaces) are testaceous beneath the pearly white basal part of hemelytra. The latter breeds in numbers in the rain water pockets of bromeliads in Trinidad.

Rhematobates hamatus, n. sp.

APTEROUS MALE: Small, dark velvety brown with small, slightly testaceous areas as described in structural characters. Antennae moderately long, moderately stout, dark brown with the basal segment testaceous; segment I considerably incrassate, thickest a little beyond base, slightly narrowed anteriorly; II very short, stout, cylindrical; III slender, slightly enlarged subbasally, there with two very long, dark brown hairs, the apical part a little flattened beneath; IV considerably flattened, curved, convex within, with dorsal edge beset with 8 or 9 rather short, dark brown, bristly hairs; measurements—I, 22; II, 6; III, 15; IV, 15. Rostrum brown. Eyes large, fuscous-brown. Body beneath dark brown, the prosternum, acetabula and last two segments of venter testaceous.

Pronotum very short, with the median part broadly testaceous. Mesonotum without color markings, a little wider than long (55:38). Abdomen above concolorous, slowly tapering posteriorly. Genital segments above slowly tapering posteriorly, truncate behind, brown with first segment testaceous, beneath entirely testaceous. Anterior legs rather stout, brown, with coxae, trochanters and femora testaceous. Middle legs very long, brown, with coxae and trochanters testaceous; femora long, considerably swollen; tibiae slender, fringed on the inner side with a row of very long hairs from slightly before middle nearly to apex; tarsi slender; measurements—femora, 60; tibiae, 50; tarsi I, 38 and II, 12. Hind legs much shorter, modified; trochanter rather long, with very long, subapical, hook-like projection on the inner side, which extends considerably beyond apex of abdomen, tapers apically, testaceous at base with hook-part brown and sharply turned downward; femora narrowed at base (as far anteriorly as hook-projection of trochanter), then slightly enlarged (not strongly swollen), with a short fringe of long hairs within subbasally; tibiae slender,

straight; tarsi short; measurements—trochanters, 22; femora, 58; tibiae, 70; tarsi I, 7 and II, 12. Venter with the last two segments testaceous. Length, 1.55 mm.; width, 0.65 mm.

Type (male), Belem, Para, Brazil, September 20, 1950, Drake Collection.

Separated at once from other small species of the genus by the large, subapical hook-like projection of the hind trochanters.

INSECT FACT AND FOLKLORE, by Lucy W. Clausen. xiv + 194 p., illustrated. 1954. The Macmillan Company, New York. Price \$3.50.

This little book, written by Lucy W. Clausen who is in the Department of Public Instruction at the American Museum of Natural History, brings together facts about insects, their folklore, superstitions, products, and the many uses to which they have been put throughout the world. Miss Clausen begins with an elementary discussion of insects in general. From the brief introduction, she leads the reader into the heart of the book, giving many examples to show that the majority of insects are interesting, necessary, and an important part of everyday life. For entertaining and informative reading about insect facts and folklore, Miss Clausen's book can be recommended. L. B.

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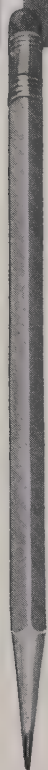
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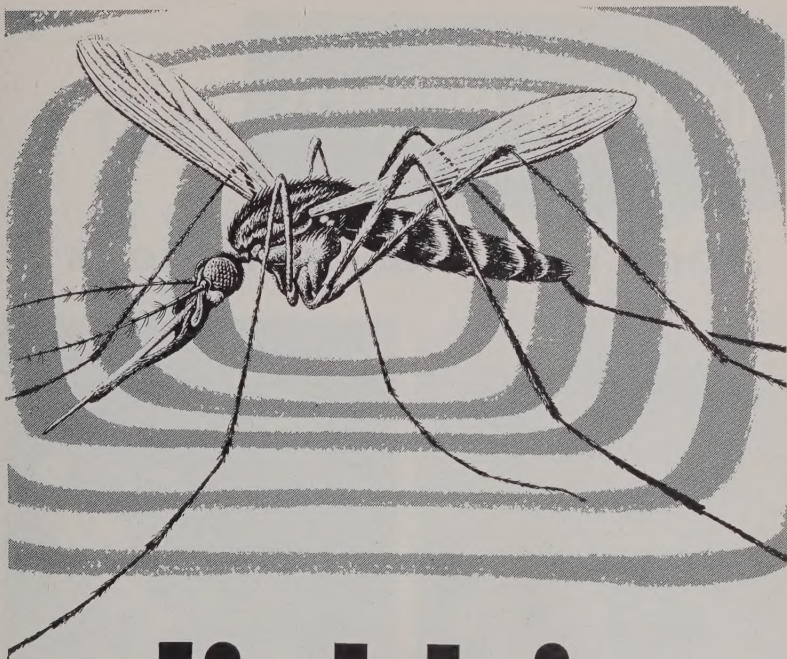
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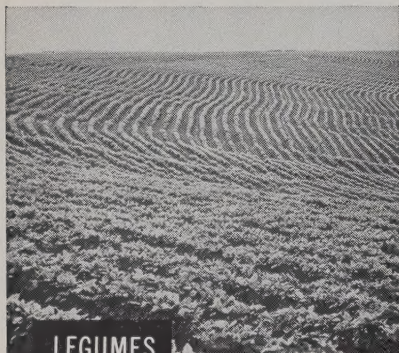
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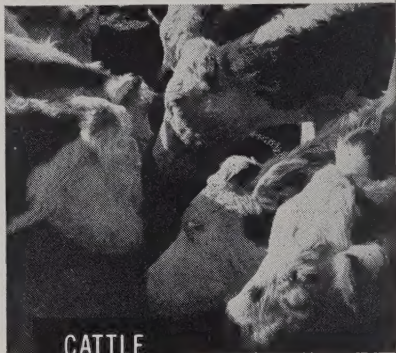


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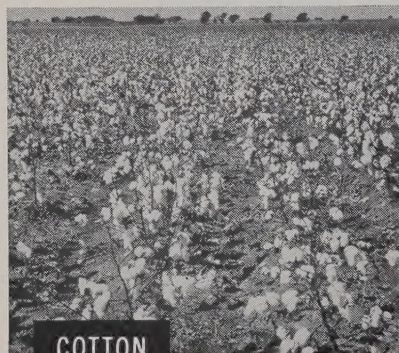
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